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# Color separation gratings for diverting the unconverted light away from the NIF target

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The current baseline design for NIF employs a wedged final focusing lens to divert the unconverted 1ω and 2ω light away from the target. The increased thickness of the glass in the UV beam path increases the B integral, thereby degrading the beam quality and increasing the risk of damage to optics. Furthermore, proposals for larger deflections of the 1ω and 2ω light would demand an even thicker wedge on the lens, further exacerbating the B integral problem.

Color separation gratings (CSGs) offer a versatile approach to reducing and possibly eliminating the unconverted light in the target region. Such gratings have been used in a variety of applications over many years, though none have been for large beam sizes as on NIF (~40 cm square). Our CSG consists of a three-level lamellar grating designed so that nearly all of the 3ω light passes through undiffracted while the residual 1ω and 2ω energy is diffracted away, at angles fixed by the grating period. Since a CSG is a thin diffractive optic (only a few waves deep), the amount of fused silica in the beam path can be substantially reduced relative to a wedged lens.

We have fabricated CSGs at apertures up to 15-cm diameter using a two-mask lithographic process and wet etching. In this presentation, we will discuss details of our design, describing theoretical predictions for the diffraction efficiencies and their sensitivities to fabrication errors. We will show examples of our fabricated gratings, and will present measurements of their optical performance.

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